

An Anthropological and Medical Analysis on Respiratory Problem and Worker's Working Condition

Dr. Ajeet Jaiswal

Assistant Professor, Department of Anthropology
Pondicherry University, Puducherry, India
rpgajeet@gmail.com

Abstract: *This study investigates the respiratory health profile of weaving workers in South India, aiming to develop workers' awareness and public attention, and to ensure a proper implementation of health and safety measures. Forced vital capacity was measured by peak expiratory flow rate instrument among 195 subjects. The personal history, the occupational history, and the state of health were also determined using a standard questionnaire. The subjects who had a considerably low peak expiratory flow rate (< 290 liters/min), and had symptoms of chronic respiratory illness, underwent X-ray examination. A statistically significant low peak expiratory flow rate was identified among 53.33 percent of workers. Among them, 44.10 percent had symptoms of cough with or without phlegm; 5.64 percent had a history of chronic bronchitis and/or asthma, and 3.59 percent experienced chest tightness or breathlessness. This study showed a high degree ($p < .001$) of respiratory-related illness symptoms present among the workers in the blow/card rooms and the workers in the spinning section. Irrespective of variation of age as well as work pattern, non-smokers were less likely to be affected. Whether workers were occupationally exposed to other incidences was also investigated. The results of these investigations are presented and the findings discussed in light of other studies carried among similar occupational groups, it seems from the study that exposure to Textile dust has effect on respiratory function rather than body morphology of the textile workers.*

Keywords: *South India, Occupational Health, Lung Function, Respiratory Disorders, Anthro-Medical.*

1. INTRODUCTION

Researches on Occupational health basically aim to protect the health of employees. Unfortunately, in India these programmes are not given due importance. The National Commission on Labour had lamented: The loss of life through the slow and agonizing process of an occupational disease may not stir the community as much as it would in other countries, although to the near ones it is a tragic occurrence. Relief gets organized soon after the events but the prevention, which is the most important component itself, gets side-tracked (Jaiswal et al, 2011).

In India there is a growing recognition of occupational health-related disorders and statutory provisions for its compensation. In addition, social, biological, physical and psychological stressors affect employee's health, morale, commitment and customer service adversely. Thus, both employers and employees have a joint interest in enhancing appreciation of these stressors, and their impact on employees and organizational well being. The assessment of Anthro-Medical profile and lung capacity is an important factor contributing to the information available concerning pulmonary function and respiratory-related diseases such as chest tightness, lung congestion, chronic bronchitis, and pain associated with breathing. The modern lung function laboratory offers a wide range of tests (e.g., spirometry, flow-volume loops, radiographic tests, diaphragmatic EMG, phrenic nerve recording) in the diagnosis of person with respiratory diseases. However, testing of anthro-medical parameter like peak flow or vital capacity alone is used as one of the important assessment and evaluation of pulmonary functions (Ress, 1998; WHO, 1984; Keith and Morgan, 1975; Gaensler and Wright, 1966).

The Micro plus spirometer or peak flow meter is simple, portable, easy to carry, and convenient for monitoring ventilatory functions in the held studies (Jaiswal, 2012; Hafez, et al, 1998; Ahasan, et al, 1997; Chandrawanshi, and Pati, 1996). This meter has generally proved convenient and accurate because PEFV (peak expiratory flow rate) provides a simple measurement of airflow obstruction (Ress, 1998; Mengesha and Bekele, 1997; Jindal, 1993; Riwa, 1991; Burge, et al, 1979). Some subjects find it possible to produce a spuriously high volume of spitting maneuver. This can be seen if

the procedure is watched and avoided by making sure that the mouthpiece is placed well inside the mouth between the teeth. The questionnaire used can also provide good data to estimate determinants causing respiratory-related illness symptoms (Norwak, et al, 1994; Korn, et al, 1987; Bakke, et al, 1992).

In this study, respiratory-related illness symptoms are defined as the prevalence of airway obstructions, and cardinal features of bronchitis—for example, frequent coughing, pneumonic illness, or chest pain that can progressively become severe and chronic, especially caused by different concentrations of textile or cotton dusts and fabric particles (Jaiswal, 2004). Respiratory-related diseases like certain types of asthma could be acute, and triggered by inhalation, absorption, or contact with textile or cotton dusts (Enarson, et al, 1987; Larson, et al, 1981; Valic and Zuskin, 1977). The ill-effects become pronounced when concentrations of dusts are high, and are more noticeable with the coarser fabrics, mainly during bale opening, blowing, carding, spinning, and weaving (Woldeyohannes, et al, 1991; Glindmeyer, et al, 1991; Zuskin, et al, 1991; Singh, et al, 1986). It can resemble chronic bronchitis that shows a decline in the ventilatory capacity (Glindmeyer, et al, 1991; Zuskin, et al, 1991; Marks, and DeLeo, 1997). Particularly, the syndrome of byssinosis may lead to permanent respiratory disability (Parikh, 1992; Schilling, et al, 1955; Takam and Nemery, 1990; El-sobkey, 1975). The effects of those symptoms are reversible in the early stages, and can be decisive with regards to continued employment (Valic and Zuskin, 1977; Glindmeyer, et al, 1991; ILO, 1993; Kawamoto, et al, 1987)

The high prevalence of respiratory problems among smokers is also compatible with impaired ventilatory performance, (Beckett, et al, 1994; Lange, et al, 1990; Lange, et al, 1989) and showed more deterioration with exposures to cotton dust and fabric particles (Kawamoto, et al, 1987; Rylander, 1987; Valic and Zuskin, 1977). Compounding factors such as heat and high humidity (Souhrada, et al, 1983), bacterial contamination of cotton dusts (Soebaryo, and Soebono, 1998; Loughweed, et al, 1995; Rylander, and Lundholm, 1978), and surrounding environment (Chavalitsakulchai and Shahnavaz, 1990; Husman, et al, 1987; Hafez, 1977) are also associated with an increased susceptibility to respiratory-related illness symptoms. In the increasing trend of such problems due to occupational exposures, local mechanization interacts positively upon the difficulties of poverty, low production, and poor health. The systems and safe-guards that protect workers are usually inoperative or ineffective due to various socio-cultural, environmental and economic factors (Chavalitsakulchai and Shahnavaz, 1990). Given this kind of situation, occupational exposure and work-related diseases can be expected in textile workers in many developing countries (Park, 1997; Lee, et al, 1991; Chavalitsakulchai and Shahnavaz, 1990; Parikh, et al, 1986; Hafez, 1977). Therefore, the working environment must employ a proactive rather than an after the fact reaction to these illness symptoms.

2. MATERIALS AND METHODS

The factories studied in this study were similar in product, process, and mechanization (cotton yarn and cloth manufacturer), and located in the Coimbatore district of Tamil Nadu (South India). Out of a total of 388 workers, 195 subjects participated from four major sections such as blowing and card room (n = 40), weaving and spinning section (n = 60), finishing sections (n = 40), and general section (n = 55). The workers (ages: 18–65 years) were adult (mean age = 36.6±11.7) male. They were engaged in drawing, feeding, monitoring machines, repair-breaks, and doff bobbing tasks that were often physically demanding. The workers were in standing, walking, and in some cases, a sitting posture. The employees who dealt with administrative jobs in the general section were mostly working in separate rooms in a bench or chair sitting position.

In the beginning of this study, factory authorities were contacted for the permission to carry out this study. Fifteen days in advance, meetings were arranged, and the workers were like-wise given general information about the study. To carry out this study, a pretested questionnaire and checklist were developed and checked by medical doctors.

The questionnaire included three sections. In the first section, workers were requested for demographic data and task/activity. The second section included items concerning personal medical history, smoking habits, and respiratory symptoms. The workers were asked whether they had occupationally suffered from cough, chest pain, or painful breathing, and prevalence of other incidences. The alternatives for answering were “yes” and “no.” The third section of the questionnaire

inquired about the specific knowledge on the occupational exposure to dusts and fabric particles. Regarding the level of dusts and fabric particles, workers were asked to pick out the items to which they had been the most exposed from six alternative frequencies (0 = none to 5 = extremely high). The level and size of dusts were further verified by visual estimation method (Ahsan et.al, 2000; WHO, 1997).

Workers were also asked to state the degree of exposure, whether they had been exposed daily, weekly, or monthly. Personal interviews were conducted with those who were not able to fill in the questionnaire forms due to a lack of familiarity with some of the terms. The combination of the rating level as well as the probability of exposures assigned the subjective ratings. Air temperature, relative humidity, noise, and illumination levels were recorded (ILO standard) in the areas where the workers seem to be exposed to working with the machine and handling with cottons.

In the second phase, Anthropometric measurements like height, weight, Waist Circumference and Hip Circumference were taken using standard procedure (Weiner and Lourie, 1981) and general adiposity like BMI and regional adiposity like WHR were calculated. Physiological measurements PEFR (i.e., maximum rate of airflow that can be achieved during a sudden forced expiration from a position of full inspiration) were monitored with the help of a Microplus spirometer. Before measuring PEFR, the subjects were trained how to blow at their maximum because PEFR is particularly impaired (i.e., very low) in the presence of diffuse airway obstructions (Ahasan, et al, 1997; Chandrawanshi and Pati, 1996; Jindal, 1993; Burge, et al, 1979; Gaensler and Wright, 1966). Each test was repeated three times and the highest reading was selected for the analysis. For every worker, measurements were performed three times: in the morning (8:00 a.m.–9:00 p.m.), at noon (12:00 –13:00 p.m.), and at the end of work (17:00 p.m.–18:00 p.m.) to determine the PEFR_{mean}. The measurements were made in a room with a temperature range of 28–31°C, and a relative humidity of 70–84 percent. With the help of mill doctors or local doctors, workers' medical histories (prescriptions for buying medicine, dispensary files, and other medical records) were checked. The subjects, who had acute symptoms and a diagnosis of a chronic lung illness, underwent X-ray tests. To condense the data, statistical analyses were performed using Statistical package like SPSS 16.0.

3. WORKROOMS AND SOURCE OF COTTON DUSTS

In the blow rooms, cottons are treated with blowing whereby the fabrics are set which prevents shrinking. Carding is a mechanical process to separate the fibers, and form them in a parallel fashion, and to remove the broken fibers and dusts from the cotton. Carders are usually wooden bats studded with rows of bent metal teeth where dusts come out, and fly around and accumulate into fleece.

Dusts accumulate around the feed roll, tat brush and hackle comb, especially due to striping the card. Dusts also fly and are released under the card, where the waste is deposited from the cylinder. The spinning sections are involved with drafting/twisting with a shuttle and spindle, and winding in the making of cloth yarn. In drafting, fibers are attenuated to make them longer and thinner. Twisting provides the force to interlock the fibers together in a strand of yarn for further processing.

In the winding process, the yarn is wound into a bobbin that is typically conducted at high yarn speeds, and results in the release of dusts. A high level of dusts can accumulate, in the rotor of the spinning sections. This section is comprised of scouring, rolling, calendering, cutting, and packaging. There are still active dusts left to be released, such as from poorly maintained filters and waste grinders. Dusts often leak when the bale is opened. In the picking process, dusts come from open hoppers, feed tables, and conveyors. If there is inadequate ventilation during card grinding, dry brushing, air recirculation, and general cleaning and overhaul, dust can also accumulate (Jaiswal, 2012).

4. RESULTS

Table1. *Distribution of Subjects according to their General characteristics and Personal medical history (N = 195)*

Characteristics	Mean (± SD)
Age (years)	36.6 ± 11.7
Length of occupation (years)	13.7 ± 6.2
Education (years)	7.9 ± 2.7
Salary (Rs)	3800 ±. 600

Anthropometric Measurements	
Height (cm)	160.9±6.3
Weight (kg)	52.4±4.6.
Waist Circumference(cm)	75.4±4.6.
Hip Circumference(cm)	83.2±7.8.
Body Mass Index (kg/m ²)	20.23±1.9
Waist hip ratio	0.90±0.1
Medical history	
	No. of workers
Visited doctors	21
Taking medicine	32
Underwent X-ray examination	9
Absent because of sickness	7

The above table shows the mean and standard deviation of workers' general characteristics and their personal medical histories. Result revealed that the mean length of occupation, level of education and monthly salary of these workers were 13.7 years, 7.9 years and Rs. 3800 respectively.

Table2. Distribution of Subjects according to level of exposure of dust and General environmental parameters

Level of exposure*	Prevalence (%)	N
Very high level	28.6	60
High level	43.7	94
Not high level	15.3	22
Seldom	12.4	19
Environmental Parameters		
Air temperature	28–31°C	
Air humidity	70–84%	
Lightening	30–35 Lux	
Noise level	80–106 dB	

*WHO, 1997

The environmental parameters are recorded, and the prevalence (i.e., estimated subjective assessment) of cotton dusts and fabric particles are summarized table 2. Nearly 44 percent of the subjects were working in a high level of dusty environment followed by very high level of dustiness (28.6), so nearly 70% of the workers were working in highly polluted environments and only 12.4 percent were working in a somewhat better environment.

Table3. Distribution of working sectors of Textile industry according to Number of workers exposed and unexposed and PEFR mean

Working sections	Prevalence		Total (%)	PEFR mean
	Exposed	Not exposed		
Blow and card room	27	13	40 (20.51)	383.6 ± 14.9
Spinning section	38	22	60 (30.77)	406.5 ± 29.1
Finishing section	21	19	40 (20.51)	466.5 ± 11.1
General section	18	37	55 (28.21)	501.5 ± 67.8
Total	104 (53.33%)	91 (46.67%)	195 (100%)	

Chi sq. = 11.74; p < .001 (with exposed and unexposed workers).

Chi sq. = 13.82; p < .001 (with production workers and service employees/general section).

In total, 46.67% of workers were not much exposed to the textile dust whereas, 104 (53.33%) workers had symptoms of respiratory illness which were significantly high (p < .001) compared with the unexposed workers (Table 3).

Table4. Distribution of Respiratory Symptoms of Workers and PEFR among the exposed workers

Symptoms/sign	Number of workers (104)	%	PEFR mean (l/min)
Cough with or without phlegm	86	44.10	433.1 ± 59.5*
Chest tightness or breathlessness	7	3.59	346.1 ± 76.9*
Chronic bronchitis and or asthma	11	5.64	277.5 ± 61.3*

*=Denotes significant difference for pairs of groups.

Respiratory-related illness symptoms were highest among the workers in the spinning section

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followed by blow and card room. The occurrences of problems were significant ($p < .001$) in the production section compared with the subjects in the general section. The differences of $PEFR_{\text{mean}}$ were highly significant ($t = -7.2$; $p < .001$) between those who had problems (406.5 liters/min), and those who had no symptoms (501.5 liters/min). Of the total respondents, 86 (44.10%) had symptoms of cough with or without phlegm followed by chronic bronchitis and/or asthma (5.64 percent) and chest tightness or breathlessness (3.59 percent). No one from the general section had the symptoms of chest tightness or breathlessness. In the general section, a total of 18 workers were found suffering from cough with or without phlegm, and only one worker had chronic bronchitis and/or asthma. Eleven workers who had symptoms of chronic bronchitis and/or asthma showed a comparatively lower PEFR (277.5 liters/min). They also showed significant ($p < .001$) difference with those who had comparatively with a higher PEFR (Table 4).

Table 5. Distribution of status of Respiratory Symptoms of Workers according to Prevalence due frequency of Smoking everyday

Symptoms/sign	Prevalence				Frequency of Smoking everyday
	Yes	%	No	%	
Present (n=104)	65	62.5	39	37.50	16.4
Absent (n=91)	35	38.46	56	61.54	8.6
Total	100	51.28	95	48.72	12.5

$Chi\ sq = 12.35, p < .001; t = 4.52, p < .001$

Regular smoking was significantly associated with the occurrence of respiratory-related illness symptoms (Table 5). The number of cigarettes and "bidi" (local tobacco based cigarettes) smoked per day were 2 to 25 sticks (mean: 12.5 sticks). In all, 100 smokers were found who smoked more than 15 sticks per day. A total of 65 smokers were likely to have impaired ventilator performance, which was correlated with the number of cigarettes and bidi smoked per day. The number of production workers in the card/blow rooms smoked more than the service employees in the general section.

Table 6. Distribution of Symptoms according to Workers' complaints (during last two weeks) concerning other symptoms/incidences

Symptoms/incidences	Prevalence	
	No. of workers complained	%
Daytime sleepiness	25	12.82
Restlessness at night	52	26.66
Snoring	38	19.48
Hypertension	32	16.41
Feeling weak	21	10.77
Sexual Problem	67	34.36
Morning headache	18	9.23
Casual Fever	15	7.69

Only 31 (15.90%) workers in the production section had been using masks for more than five–seven years, and the prevalence seems minimal for them. No significant association was found between illness symptoms and the length of their service. Respiratory illness was suspected among the workers with more than 3 years of employment. However, the workers complained about other symptoms and incidences (Table 6). The prevalence of restlessness at night was 26.66 percent, mainly among the production workers. The cases of sexual problem (34.36%) seem to be associated with low nutrition and poor health. In all, 15 subjects (7.69%) suffered from the prevalence of casual fever. This case was suspected with certain explanatory factors, such as tropical climate and unhygienic living conditions in the suburb.

5. DISCUSSION

Measured in terms of production, the number of workers engaged, and the amount of foreign exchange earned from its export, textile, and ready-made garments are one of the most important industries in India. Indeed, for many reasons workers are exposed to various occupational diseases, and they can go undiagnosed and untreated. Worst of all, preventive measures are not taken seriously due to a lack of proper health care programs and the needed facilities, and lack of awareness of the problem.

Even though their anthropometric parameters were quite normal but a very few people maintain health

and safety standards mainly due to a high rate of illiteracy, poor economic conditions, and sociocultural traditions. Moreover, industrial activities usually take place in small informal settings that lack the enforcement of health exposure limits. Crowded working conditions and unhygienic environments, for instance, are most likely causes of breathing difficulties in unhygienic environments, compounded for respiratory-related illness symptoms.

From dispensary data and medical history it was proved that the workers suggested preponderance for upper respiratory irritation especially for those who had low PEF. Chest tightness was more prevalent among those who had worked the longest period. Again, when the workers are smoking and at the same time exposed to cotton dusts and fabric particles, the effects of smoking on their symptoms may overshadow the causative effects of cotton dusts. Duration of employment and habitual/regular smoking explained the increased frequency of respiratory illness.

In all factories studied, the warehouses and workrooms were dusty since the wastes were handled mostly manually. There are often legal, regulatory, technical, economic, and other barriers that might prevent effective control programs. The private mill owners are reluctant to provide sufficient health protection. In general, there are false excuses for dealing with the expensive prevention on health and safety measures by the industrial entrepreneurs. The public sector industries in India are mostly loosing concern. The management lacks resources to protect or increase workers' health and safety. The health inspectors do not usually visit factory premises unless a severe accident happens. There are provisions or control of health hazards associated with the particular operations in India but a very few people maintain health standards, mainly because of a high rate of illiteracy and poor economic conditions.

Anthropo- Medical problems related to occupational are only reported when the workers need to ask for compensation through the legal means, which is now working under the Minister of Labour and Employment. The GOI has framed some aspect of industrial health policy and environmental legislation that are merely institutionalised. Minister of Micro, Small and Medium Enterprises, Minister of Labour and Employment, Minister of Social Justice and Empowerment, Minister of Health and Family Welfare and the other concerned organisations has little contribution to develop health and safety measures. The work legislation and health policy are not practically implemented, and therefore, it could not bring workers' health and safety.

Indeed, the GOI is trying to attract foreign investors and private-sector entrepreneurs for employment generation (Minister of Micro, Small and Medium Enterprises, 2014). ILO (International Labor Organization), WHO (World Health Organization), and United Nations Development Program (UNDP) activities are not effective and fruitful enough for implementing health and safety practices due to local problems and cultural constraints due to either unfavorable policy of the private mill owners or the bureaucratic system of the public entrepreneurs. However, recently, foreign and private sector entrepreneurs are taking advantage of cheap labor. Industrial entrepreneurs do not care about health or environmental policy.

6. LOCAL MEASURES: PREVENTION AND CONTROL

In spite of many obstacles, preventive measures and treatment programs are feasible to reduce work-related illness symptoms. By using appropriate methods, a number of countries gained positive experiences (Bimonte, 1998; Rantanen, 1997; Wafu, 1996; Kogi, 1991). ILO and WHO programs on occupational hygiene (WHO, 1997, 1994, 1986; Mikheev, and Goelzer, 1996; ILO, 1980) and checklists were implemented in Southeast Asia, Africa, and Latin America through different projects, which are still lacking in India especially in South India.

However, it could be of great help, if NGOs (Non-governmental Organizations) and other social organizations take responsibility in formulation and implementation of health regulations and medical surveillance. The enforcement of health and safety exposure limits is to be implemented by the Government of India (GOI), giving special facility (e.g., raising the fringe benefits, and providing vehicles and equipment) to the factory inspectors.

The researcher would expect that health regulation should be implemented both at the national and enterprise level, and the GOI should give arrange job training and health education for industrial entrepreneurs and workers as well. With the collaboration between NGOs and the public and private sector industries, the state-owned training institutes could be used for workers' training and health education.

It is also important that factory management should know the key elements of production and recognize worker's health as vital for economic development. The identification of occupational health risks and the implementation of safe work practices especially (concerning cleanliness, spacing, ventilation, sanitation, and drainage) should be clearly outlined in the Factories Act, 1948 (Ministry of Labour and Manpower, GOI). The Inspection Manual (1987) provides rules and regulations for the inspectors of factories.

During walk-through inspections, it was seen that routine cleaning was irregular, and equipment was not regularly maintained. Housekeeping and cleaning must be scheduled. Routine maintenance must ensure that equipment and machines are functioning properly, and kept clean, especially the receiving tank which collects dusts from the central vacuum. To achieve an impact in the prevention of respiratory-related illness, utilization of exhaust air ventilation is important.

In South India, air circulation is implemented by exit-fan or blower and opening the windows that may not be sufficient for good airflow distribution and to keep optimal temperature and humidity in the workrooms. Saarinen (1997) emphasized the dilution ventilation and one- to three-stage air-conditioning system that can be used to control the cellulotic fibers, and to keep the standard dust concentrations under 0.1 mg/m^3 . Generally, small particles, between $3\text{--}9 \text{ }\mu\text{m}$, can be inhaled through the nose, and are thus likely to be deposited in the respiratory bronchiole (Jaiswal, 2012).

Respiratory protective devices (e.g., breathing apparatus, gas mask, dust-proof respirator) should be effectively used to protect against the penetration and deposition of cotton dusts. In this context, Shephard (1961) noted ergonomics way of using respiration and Barnhart(1997) reviewed new and persistent challenges to reduce lung-induced lung disorders. Medical surveillance, such as a cardiorespiratory fitness check-up, is needed to ascertain job-demand- fitness compatibility. Stopping smoking also tends to help breathing return to normal from a state of deteriorated ventilatory performance (Minister of Health and Family Welfare, 2003; Department of Tuberculosis. 2002; Ahasan et al, 1998). Mill doctors' advice and medicines should be free and available for all affected workers. Treatment should be without side effects (e.g., hypersensitivity, headache). Continuous treatment for at least few months is essential for these patients, though many in South India do not continue treatment for the required (Minister of Health and Family Welfare, 2003) period.

The rate of such discontinuities among the patients is about 60–80 percent, which is the greatest obstacle in controlling respiratory-related illness symptoms. Cultural significance, (Ahasan, et al, 1998; Zohir, and Majumder, 1996; Cohen, et al, 1983), which is associated with traditional practices, must be manipulated effectively with the intervention programs, such as job training in appropriate machine utilization, safety skills, and health awareness and in the concept of health and safety problems (Christiani, 1990; El-Batawi, 1981). In this anthropo- medical study, only 15.90 percent workers used masks; however, this demonstrated the great need for recognizing the importance of using personal protective devices. The workers also need to be informed of the potential health and safety risks by posters, stickers, and weekly instructions to create a cleaner and healthier workplace.

7. CONCLUSION

Determining such work-related respiratory problems using PEFr-measurement can be tedious.

An objective diagnosis for dealing with pulmonary function needs to attribute proper assessment and treatment because the type of respiratory problems may be exposure to the specific person, and related to the particular environment. In this context, there are not clear figures available for the average or normal lung conditions for South Indian populations of similar ages. The key to dealing with respiratory diseases lies in finding new ways to identify, attribute, diagnose, and treat them because the type of determinants varies, and thus, respiratory illness symptoms may vary greatly depending on the person exposed. So, it seems from the study that exposure to Textile dust has effect on respiratory function rather than body morphology of the textile workers

The limitations of the methodologies include the interview period, which was not lengthy enough to make an exact diagnosis and come to a final conclusion. The subjects need to be studied in detail for a longer period of time. The workers were hesitant to cooperate for fear of losing their jobs in the face of the high unemployment situation, and a lack of social and political rights for the workers' union. This under-reporting may also be due to a lack of trust toward the interviewers. Therefore, as far as the prevalence of occupational respiratory problems is concerned, the cases described here do not necessarily include the real trend. The author believe that workers are not only affected by their own

occupational exposures to fabric particles and cotton dusts - the whole country is concomitantly exposed to many other pollution and confounding factors such as unhygienic working conditions, poor physiological features, and tropical climate. Therefore, a regular health and safety surveillance is needed to ensure work-related problems are kept to a minimum.

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REFERENCES

- [1] Ahasan, M.R., Khan, A.W. and Al-Mahtab, M. 1998. Small and Medium Sized Chemical Factories in Bangladesh – Occupational Health and Safety Measures. In: P.A. Scott and R.S. Bridger, Eds., Elsevier Science, 271–275.
- [2] Ahasan, M.R., Ahmad, S. A. and Salim-Ullah, M.H.S. 1997. Respiratory Symptoms Among Textile Mill Workers in Bangladesh. In Human Factors Vision Care for the Future, Ergonomic s Association Press, Louisville, 111–116.
- [3] Ahasan, M.R., Mohiuddin, G. and Va` rrynen, S. 1998. Work-Related Problems in Metal Handling Tasks in Bangladesh: Obstacles to the Development of Safety and Health Measures. *Ergonomics* 42(2):385 –396.
- [4] ARPLA. 1991. Profile on Occupational Safety and Health in Bangladesh. In: H. Ono, Ed., Asian and Pacific Regional Center for Labour Administration, Bangkok.
- [5] Bakke, P., Valborg, B. and Hanao, R. 1992. Occupational Airborne Exposure of the General Pollution of a Norwegian County. *Scand J Work, Environ Health* 18:44–51.
- [6] Barnhart, S. 1997. Dust-Induced Lung Diseases: New and Persistent Challenges. *African Newsletter on Occupational Health and Safety*, 7:3.
- [7] Beckett, W.S., Pope, C.A. and Christiani, D.C. 1994. Women's Respiratory Health in Cotton Textile Industry. An Analysis of Respiratory Symptoms in 973 Non-Smoking Female Workers. *Occup Environ Med*, 51(1):14–18.
- [8] Bimonte, A. 1998. Environmental Awareness Training: Professional Safety. *J Am Soc Safety Engin* 5:40–43.
- [9] Burge, P.S., O'Brien, I.M., Harries, M.G. 1979. Peak Flow Rate Records in the Diagnosis of Occupational Asthma Due to Colophony. *Thorax* 34:308 –316.
- [10] Chandrawanshi, A. and Pati, A.K. 1996. Impairment of Peak Expiratory Flow Rate in Shift Workers. *Intern J Indus Ergon* 17:431– 435.
- [11] Chavalitsakulchai, P., and Shahnavaaz, H. 1990. A Study of Health, Working Conditions, and Working Life of Female Shift Workers in a Large Textile Industry of Thailand. *J Occup Accid*, 12:249–250.
- [12] Christiani, D.C. 1990. Occupational Health in Developing Countries. *Am J Ind Med*, 17:393 – 401.
- [13] Cohen, N., Measham, A.R. and Akbar, J. 1983. Smoking and Respiratory Disease Symptom s in Rural Bangladesh. *Public Health, London*, 97.
- [14] Department of Tuberculosis. 2002. Unpublished Report, Institute of Preventive Medicine, Andhra Pradesh, India.
- [15] El-Batawi, M.A. 1981. Special Problems of Occupational Health in the Developing Countries. In: *Occupational Health Practice*, 2nd ed. R.S.F. Schilling, Ed., 27–46.
- [16] El-sobkey, M.K. 1975. Study of Byssinosis Among Cotton Workers. Unpublished MD Thesis, Faculty of Medicine, Cairo University.
- [17] Enarson, D.A., Vedal, S. and Schulzer, M. 1987. Asthma, Asthma- Like Symptoms, Chronic Bronchitis, and the Degree of Bronchial Hyper-Responsiveness in Epidemiological Surveys. *Am Rev Resp Dis* 136:613 –617
- [18] Factory Act. 1948. Ministry of Labour and Manpower, Government of India.

- [19] Gaensler, E.A. and Wright, G.W.1966. Evaluation of Respiratory Impairment, Arch Environ Health, 12:146 –148.
- [20] Glindmeyer, H.W., Lefante, J.J. and Jones, R.N. 1991. Exposure - Related Declines in Lung Function of Textile Workers. Am Rev Resp Dis 144:675 –683.
- [21] Guide to Investment in India. 2014. Board of Investment, Minister of Micro, Small and Medium Enterprises, Government of India.
- [22] Hafez, N.A. 1977. Retrospective Study in the Ecology of Chronic Lung Disease among Industrial Workers. MD Thesis, Faculty of Medicine, Cairo University.
- [23] Hafez, N.A., Hasan, M.H. and Al-Azab, R.M. 1998. Health Profile of Textile Workers in an Egyptian Textile Factory. African Newsletter on Occupational Health and Safety 8:19–22.
- [24] Husman, K., Koskenvuo, M. and Kaprio, J. 1987. Role of Environment in the Development of Chronic Bronchitis. Eur J Resp Dis 71 (suppl 152):57–63.
- [25] ILO. 1993. Encyclopedia of Occupational Diseases, Third ed, 351–353, 557–559, 2167 –2169. International Labor Organization: Geneva.
- [26] ILO: 1980. Guidelines for the Use of ILO International Classification of Radiographs of Pneumoconiosis. Occupational Safety and Health Series, No. 22 (rev). International Labor Organization, Geneva.
- [27] Inspection Manual (Guidelines) 1987, for the Inspectors of Factories. The Tamil Nadu Industrial Establishments (Conferment of Permanent Status to Workmen) Act, 1987.
- [28] Jaiswal, A. 2004. Respiratory efficiency as affected by exposure to textile dust: health status evaluation of textile workers of district Varanasi, Utter Pradesh. Gene. Envir. and Health. 135-162.
- [29] Jaiswal A, Kapoor A.K., Kapoor S. 2011. Health conditions of a Textiles Workers and their association with breathing condition. The Asian Man, AnInt J. 1: 28-33.
- [30] Jaiswal A. 2012. Anthro-Medical profile of Textile workers, AlfaPublicaton, New Delhi. 11-56.
- [31] Jaiswal, A. 2012. A Study Factors Associated With the Deterioration of Respiratory Function among Male Textile Workers in Uttar Pradesh” Ind. J. Pub. Hea, Res. Dev, An Int J. 3 (03): 1-5.
- [32] Jindal, S.K. 1993. Field Study on Follow-Up at 10 Years of Prevalence of Chronic Obstructive Pulmonary Disease and Peak Expiratory Flow Rate. Indian J Med Res 98:20–26.
- [33] Kawamoto, M.M., Garabrant, D.H., and Held, J. 1987. Respiratory Effects of Cotton Dust Exposure in the Cotton Garneting Industry. Am J Ind Med 11:505 –515.
- [34] Keith, W. and Morgan, C. 1975. Clinical Significance of Pulmonary Function Tests. Disability or Disinclination? Impairment or Importuning? Chest 6:712–715.
- [35] Kogi , K.1991. Supporting Tools for Participatory Workplace Improvement in Small Enterprise in Developing Countries. In: Designing for Everyone , Y. Queinnec and F. Daniellou, Eds., Proceedings of the 11th International Ergonomics Association, Paris, 1682 –1682.
- [36] Korn, R.J., Dockery, D.W., and Speizer, F.E. 1987. Occupational Exposures and Chronic Respiratory Symptoms: A Population Study, Am Rev Resp Dis 136:298 –304.
- [37] Lange, P., Groth, S. and Nyboe, J. 1989. Effects of Smoking and Changes in Smoking Habits on Decline of FEV1. Eur Resp J, 2:811–816.
- [38] Lange, P., Groth, S., and Nyboe, J. 1990. Decline of the Lung Function Related to the Type of Tobacco Smoked and Inhalation. Thorax 45:22–26.
- [39] Larson, R.K., Barman, M.L. and Smith, D.W. 1981. Study of Respiratory Effect of Short-Term and Long- Term Cotton Exposure. Chest, 79:22–26 .
- [40] Lee, H.S., Phoon, W.H. and Wand, Y.T. 1991. Occupational Asthma in Singapore- A Review of Cases from 1983 to 1990. Singapore Med J, 32:398–402.
- [41] Loughweed, M., Roos, J. and Waddell, W.1995. Desquamative Interstitial Pneumonitis and Diffuse Alveolar Damage in Textile Workers: Potential Role of Mycotoxins. Chest, 108:1196 –2000.
- [42] Marks, J.G. and DeLeo, V.A. 1997. Textile Workers. In: Contact and Occupational Dermatology, Mosby, St Louis, 347–350.

- [43] Mengesha, Y.A. and Bekele, A. 1997. Dust Exposure in Ethiopia: Effect of Acute Exposure to Different Occupational Dusts on Pulmonary Function Indices of Factory Workers in Ethiopia. *African Newsletter on Occupational Health and Safety* 7:8–9.
- [44] Mikheev, M. and Goelzer, B. 1996. WHO Program in Occupational Hygiene. *African Newsletter on Occupational Health and Safety* 6(3):60–63.
- [45] Minister of Health and Family Welfare, 2003. Statistical Annual Report of Respiratory Related Diseases. Report, Government of India.
- [46] Norwak, D., Jorres, R., and Iversen, M. 1994. Epidemiology of Respiratory Symptoms among German Farmers: A Cross-Sectional Questionnaire Study. *Am Rev Resp Dis* 149:399.
- [47] Parikh, J.R. 1992. Byssinosis in the Developing Countries. *Br J Ind Med*, 49:217–219.
- [48] Parikh, J.R., Chatterjee, B.B. and Rao, N.M. 1986. The Clinical Manifestation of Byssinosis in Indian Textile Workers. *J Soc Occup Med*, 36:24–28.
- [49] Park, H.S. 1997. Occupational Asthma in Korea. *Chonnam Medical J*, 1 10:73–78.
- [50] Rantanen, J. 1997. New Trends in Occupational Health Services. *African Newsletter on Occupational Health and Safety* 7:12–13.
- [51] Riss, J. 1998. *Diagnostic Tests in Respiratory Medicine*: Cambridge University Press, London, 11-19.
- [52] Riwa, P.G. 1991. A Pilot Survey on Respiratory Symptoms Among Workers in an Asbestos Cement Factory in Dares Salaam. *African Newsletter on Occup Health and Safety*, 1:20–21.
- [53] Rylander, R., 1987. The Role of Endotoxin for Reactions After Exposure to Cotton Dusts. *Am J Ind Med*, 12:687–697.
- [54] Rylander, R., and Lundholm, M. 1978. Bacterial Contamination of Cotton and Cotton Dust and Effects on the Lung. *Br J Ind Med* 35:204–207
- [55] Saarinen, L. 1997. Cotton dust control. *African Newsletter on Occupational Health and Safety* 7:12–13.
- [56] Schilling, R.S.F., Hughes, J.P.W. and Dingwall-Fordyce, I. 1955. An Epidemiological Study of Byssinosis Among Lancashire Cotton Workers. *Br J Ind Med* 12:217–227.
- [57] Shephard, R.J. 1961. Ergonomics of the Respirator in Design and Use of Respirators. In: *Proceedings of a Joint Meeting of the Ergonomics Research Society and the British Occupational Hygiene Society (Porton)*, Penguin, London
- [58] Singh, S.H., Gupta, H.O. and Gandhi, A. 1986. A Study of Lung Function Abnormalities in Workers of Cotton Spinning Shops. *Indian J Physiol and Pharma* 30:79–84.
- [59] Soebaryo, R.W. and Soebono, H. 1998. Contact Dermatitis among Traditional Batik and Textile Factory Workers in Indonesia. *Asian-Pacific Newsletter on Occup Health and Safety* 5:6–7.
- [60] Souhrada, J.F., Presley, D., and Souhrada, M. 1983. Mechanism of the Temperature Effect on Airway Smooth Muscle. *Resp Physiol*, 53:225–233.
- [61] Takam, J. and Nemery, B. 1990. Byssinosis in a Textile Factory in Cameroon: A Preliminary Study. *ILO-CIS Bulletin*, 326. Geneva.
- [62] Valic, F. and Zuskin, E. 1977. Respiratory Function Change in Textile Workers Exposed to Synthetic Fibers. *Arch Environ Health* 32:383–387.
- [63] Weiner J.S. and Lourie J.A. 1981. *Human Biology: A Guide to Field Methods*. International Bio.Prog., IBP No 9, Marylebone London NW.
- [64] Watfa, N.T. 1996. ILO Program in Occupational Hygiene. *African Newsletter on Occupational Health and Safety* 6(3):64–66.
- [65] WHO, 1984. Evaluation of Exposure to Airborne Particles in the Work Environment, World Health Organization, Geneva, 53–84.
- [66] WHO, 1986. Early Detection of Occupational Disease, 30–32. World Health Organization, Geneva.
- [67] WHO, 1994. *Global Strategy on Occupational Health for All*. World Health Organization, Geneva.
- [68] Woldeyohannes, M., Bergevin, Y. and Mgeri, A.Y. 1991. Respiratory Problems among Cotton Textile Mill Workers in Ethiopia. *Br J Ind Med* 48(2):110–115.

- [69] Zohir, S. and Majumder, K. 1996. Occupational Health of Garments Workers in India. Unpublished Report, Indian Institute of Advanced Studies. India.
- [70] Zuskin, E., Ivankovic , D. and Schachter, E.N. 1991. A Ten-Year Follow-Up Study of Cotton Textile Workers. *Am Rev Resp Dis* 143(2):30–35.